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MOVEMENTS OF PURSUIT AND AVOIDANCE AS EXPRESSIONS OF SIMPLE FEELING

By PAUL THOMAS YOUNG, University of Illinois

In a previous experimental study¹ (conducted at the University of Minnesota) it was concluded that unpleasantness is associated with a widespread bodily response while pleasantness is lacking, for the most part, in organic and kinaesthetic processes. "With U there are withdrawing movements, frowning, straining, reflexes of expulsion, etc., while P is characterized by mere acceptance of the situation and the passive yielding to it. . . . P is felt when one relaxes, or simply 'does nothing.' " The data furnished abundant evidence for the correlation between U and movements of avoidance; but they cast a shadow of doubt upon the generally accepted correlation between P and movements of pursuit.

In a recent study² Corwin has advanced the criticism that our failure to find seeking movements as involuntary expressions of pleasantness is the result of experimental conditions and methods. Referring to our original study she raises the objection that the subjects "were seated throughout. . . . (the) experiment in a comfortable chair, they were already relaxed, and therefore it was easier for them to be 'passive and receptive' with P than with U stimuli. Their bodily comfort was a source of constant P stimulation." But a more important criticism, she continues, lies in the inadequacy of experimental conditions for producing P responses. "If an *O* has a P stimulus placed under his nostrils, there is no incentive for him to make seeking movements, unless *E* begins to withdraw the stimulus. Indeed, when we repeated the Olfactory Experiment under Young's conditions and instructions, we found no definite seeking movements or tendencies to move."

Corwin, therefore, modified experimental conditions. Instead of making her subjects comfortable in a Morris chair she used one of the ordinary type in which their bodily position would be a matter of indifference. She arranged "a situation in which the *O* must seek if he desires to retain a P." There were three experiments. (1) Vials of P and U smell substances

¹Young, P. T., Pleasantness and Unpleasantness in Relation to Organic Response, this JOURNAL, 1921, 32, 38f.

²Corwin, G. H., The Involuntary Response to Pleasantness, this JOURNAL, 1921, 32, 563f.

were placed upon the end of a moving rod arranged in such a manner that the stimulus would recede from the subject's nostrils at the rate of 1.7 cm. per sec. In order to get graphic records a band, attached to the subject's head, was connected to an ergograph the marker of which wrote upon a smoked kymograph sheet. (2) In a cutaneous experiment P and U stimuli were drawn slowly across the subject's forehead while *E* observed whether or not there were following or avoiding movements. (3) Agreeable and disagreeable music, and other auditory stimuli, were led to the subject's ear through a rubber tube from another room. One *E* controlled the source of sound while another "moved the free end of the tube gradually away from *O*'s ear."

From the introspective reports and the graphic records Corwin concludes "that definitely seeking or maintaining reactions to P stimulations are found in 84.3% of the total number of P cases."

For two reasons it seemed advisable to repeat Corwin's experiment under slightly different conditions. In the first place, her moving stimuli suggested that the pursuit movements which were found may not be genuine expressions of pleasant feeling, and that another interpretation may be possible and perhaps preferable. Corwin herself notes that pursuit sometimes occurs "for another reason than P." In the second place, she has not treated the data comparatively by showing the number of times pursuit was found with U and avoidance with P; and the study is, consequently, one-sided and incomplete. Accordingly we have taken for an experimental problem: movements of pursuit and avoidance in relation to P and U. By 'pursuit' is meant any movement toward the stimulus-object; by 'avoidance', any movement in the contrary direction. Is pursuit, as a matter of fact, correlated with pleasant feeling and avoidance with unpleasant feeling?

I. EXPERIMENTAL

The following experiment was conducted in the Psychological Laboratory, University of Illinois, in the fall of 1921.

The subject² was seated in a white enamel, straight-back iron chair. One end of a tape was attached to *S*'s head and the other to a Mosso ergograph which was clamped firmly to a table at the rear. The ergograph recorded upon a smoked kymograph

²There were two subjects, Miss H. A. Anderson (*A*) and Dr. C. R. Griffith (*G*), both members of the department.

The chair was selected chiefly to meet the criticism that a Morris chair is relaxing and hence unfavorable to active movements. It is slightly uncomfortable, rather than comfortable. For a brief description see: Griffith, C. R., *The Organic Effects of Repeated Bodily Rotation*, *Jour. of Exper. Psychol.*, 1920, 3, 20f. and ref.

sheet. After a number of preliminary trials the ergograph was discarded, for it was found to be too insensitive to record very slight involuntary movements. In its place was substituted a Porter⁴ lever, which carried a light straw. The lever magnified the actual extent of head movements 7 to 12 times, varying with the straw (which was changed several times during the course of the experiment). As the experiment proceeded the kymograph also was eliminated and graphic records were not taken; it was found that *E* could directly observe and record to better advantage the movements of the pointer. As an aid to observation a white card with black radial lines (about 1 cm. apart, radius 20 cm.) was clamped firmly to a standard behind the pointer. A rubber band, just above the pivot of the lever, kept the tape tight. The position of the pointer upon the scale could be adjusted by moving the standard forward or backward.

The Olfactory Experiment. The following typewritten instruction was used:⁵

"You will be given a series of olfactory stimuli, some of which are *intensive* odors, some have no odors at all. At the signal 'now' smell the stimulus.

"You are asked (1) to report whether the immediate experience is pleasant, unpleasant or indifferent, and to indicate the *intensity of the feeling* (using, for example, such terms as 'very weak,' 'weak,' 'moderate,' 'strong,' 'very strong'); and (2) to report all muscular tendencies and organic sensations in any way related to the affective reaction."

S was seated, his eyes closed. The stimulus was placed beneath his nostrils 1 cm. or more away. He was permitted to take two and, rarely, three full inhalations. The stimulus was not withdrawn except when there was danger of touching *S*, for it seemed methodologically better to hold the vial in such a position that *S* could move freely toward it or away from it, as the case might be, without definitely suggesting movement by withdrawing the stimulus-object. The apparatus was so delicate that it indicated immediately the slightest movement in either direction. *E* learned to watch the indicator in indirect vision.

The following stimuli were used: oil of mace; stale cheese; oil of juniper; anise; ess. wintergreen; camphor; oil of bergamot; oil of lavender; mutton tallow; heliotrope; heliotropine; oil of lemon; tar water; cloves; nitrobenzol; and a series of eight odors prepared by C. H. Stoelting Co. (sulphuric ether, oil of cloves, oil of peppermint, oil of rose, old fish, carbon disulphide, strong cheese and asafoetida).

⁴The device is a light muscle-lever, with double-hook straw fastener, pictured by W. T. Porter in *An Introduction to Physiology*, 1906, 86. The arrangement proved very satisfactory in that it indicated the slightest movements. Probably these movements could be studied even more minutely by attaching a mirror to *S*'s head, so that a beam of light would be reflected upon the wall or ceiling.

⁵It is identical with the instruction used by Corwin; the last paragraph is practically the same as that of the Minnesota study. *G* asked, somewhat facetiously, how an olfactory stimulus could "have no odor at all!"

To reproduce Corwin's conditions as closely as possible, an electric fan was operated throughout the experimental period. It "served the double function of keeping the air in motion and of eliminating the noise of the kymograph."

TABLE I

Observed movement	P reported Subject		U reported Subject		Indifference Subject		Total
	A	G	A	G	A	G	
Forward	30	5	2	0	2	4	43
Backward	3	0	23	11	0	1	38
None	4	4	4	2	5	5	24
Forward & backward	1	5	2	5	0	3	16
Total	38	14	31	18	7	13	121

Results. Table I shows the gross results. It will be seen immediately that P tends to be associated with forward movement (35 out of 52 cases) and U with backward movement (34 out of 49 cases). Indifference is characterized by no movement (10 out of 20 cases).

With *G* there are three cases of discrepancy between the movements of the pointer as observed and recorded by *E* and the verbal reports of movement processes experienced by *S*. Following are excerpts from these reports:

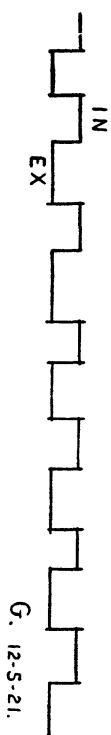
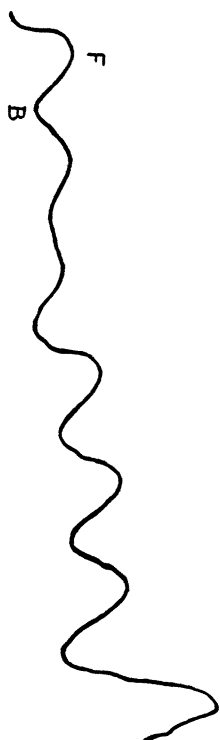
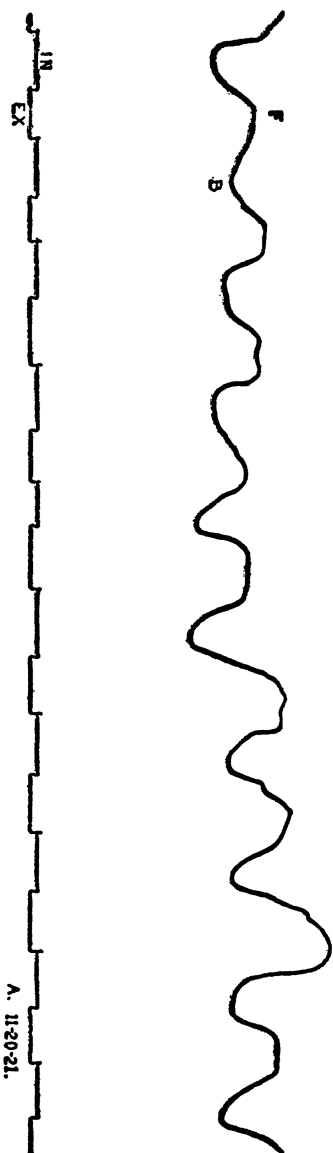
"Decidedly U. Kinaesthesia about mouth and nose and neck as in withdrawal." (Pointer makes a slight movement in the forward direction.) "An exact duplication of the former experience." (The next report; no movement observed.) "Very intense. Extremely U and disgusting. Kinaesthesia about the mouth and face and neck meaning withdrawal." (The pointer makes a gradual and wave-like movement in the forward direction.)

These ambiguous cases have not been included in the data of the table.

The cases in which both forward and backward movements were observed (during the period of stimulation) are usually reports of weak P and U. Following are instances from the data of subject *G*.

"Affectively indifferent." (Slight forward and backward movement.) "Quite P." (Alternate movements in both directions.) "A slight tinge of U." (Movements forward and backward.) "Neither P nor U affectively." (Movements in both directions.) "Faintly U to start with; becoming I as the olfactory quality disappeared." (Slight forward, then backward, then forward movement observed.) "Faintly P." (Forward, backward, forward.) "Rather I." (Forward, then backward movement.) "Very faint; just perceptibly P." (Forward, then backward movement.) "Mildly U becoming very U toward the end." (The pointer makes a slight, gradual forward movement and then a backward.)

One report of *A* was thrown out because it was too complex affectively; the movements of the pointer were complicated and could not be adequately observed by *E*.



GRAPHIC RECORD OF RESPIRATORY MOVEMENTS

F = Forward movement

B = Backward movement

IN = The duration of inspiration
EX = The duration of expiration

From the quantitative data and from the reports of the subjects two conclusions may be drawn. (1) There is probably a tendency for forward movements to occur when *S* reports pleasantness, and also a tendency for backward movements to be associated with unpleasantness. Indifference and weak *P* and *U* are characterized by no movement, or else by slight movements in both directions. (2) It is apparent that the correlation is not perfect; in this respect it resembles other correlations gained by the expressive methods.

Breathing Movements. Since every case of smelling is a reaction in which air is inhaled through the nostrils and into the lungs, it is important to know whether normal breathing is accompanied by any characteristic forward or backward movement. To test the matter a number of graphic records were taken on both subjects and also on two individuals not regular subjects in the experiment.

S was instructed to breathe deeply during the test; his eyes were closed. *E* stood to the right of *S* and slightly in front; from this position he could readily observe respiration. At the beginning of every inspiration *E* pressed a hand-key, keeping it pressed throughout the inhalation period; at the beginning of expiration *E* released the key, keeping it released during the period of exhalation. The key was connected to an electric marker which left a tracing upon the smoked paper. The kymograph was not started until breathing seemed normal and regular.

The curves show that inhalation is accompanied by a slight backward movement of the head while expiration is accompanied by a slight forward movement. The changes are purely mechanical and "express" the fact that breathing involves in a particular way the musculature of the chest, shoulders and neck.

For present purposes the significance of these respiratory movements is this: inspiration is accompanied by slight "withdrawing" movements which bear no special relation to the affective phase of experience; and, similarly, mere exhalation is accompanied by "seeking movements." Respiration may account for some of the backward movements associated with affectively weak or indifferent stimuli; and possibly, also, for those instances in which both forward and backward movements were observed; but in these cases the forward movement was regularly observed before the backward, indicating that there are other complicating factors involved.

Pursuit Movements and Attention. (A) *Olfactory Reports.* Both subjects report that when the olfactory quality is of weak intensity there are movements toward it in order to get a better smell, a more intensive and a clearer quality. Possibly sensory

adaptation which rapidly reduces the intensity of weak olfactory processes gives rise to "seeking movements" of this sort. At any rate these movements "express" olfactory attention and have at best a doubtful relation to the affective phase of the experience. Following are excerpts to illustrate the point:

Subject A. "P. A tendency toward it; I think that was because it was weak." "P. A slight tendency to go in the direction of the object, but that was because it was weak as much as anything else." "P. A tendency to draw toward it, largely because it is weak." "P. A tendency to draw towards it, partly because it is weak."

Subject G. "Faintly P. Just a little kinaesthesia about the face as if trying to smell to better advantage." "Rather indifferent. A little kinaesthesia about the neck as if leaning forward trying to get a better perception." "A faint tinge of U holding over from the last experience. A bit of kinaesthesia as if trying to get a better smell." "No olfactory quality. The whole experience was indifferent affectively. There may have been a slight change in pressure meaning bending forward to get a better smell." "Rather indifferent. Leaning forward to get a better smell." "Affectively indifferent. A change in kinaesthesia which meant leaning forward to get a better smell." "Perhaps a shade of kinaesthesia which meant leaning forward to get a better smell. Nothing affectively."

In this connection it should be noted that *G* sometimes refers to an 'inviting' character which is not identified with P or U. "It was not P or U; it was rather inviting." "There was a piercing quality that was inviting." "A faint tinge of something rather curiously inviting. I don't know whether there was any positive kinaesthesia of approach or whether it was just the absence of withdrawal." (Slight forward movement recorded.) "Curiously P; rather invitingly P." "Rather invitingly P. The inviting part is carried in kinaesthetic tendencies to move forward. Later it became faintly U and the kinaesthesia that had meant forward movement then dropped out." "Neither P nor U; affectively neutral. Rather inviting; carried in terms of kinaesthesia and those muscular tendencies and the bodily set necessary to get a better smell."

This 'inviting' character is apparently related to approach and the attempt to get a clear perception, but it is not to be confused with P.

(*B*) *The Auditory Experiment.* In view of the result that sensory attention may be accompanied with slight forward movement it seemed advisable to study the involuntary response to an affectively indifferent auditory stimulus. Corwin led phonograph music to the ear of *S* through a rubber tube and then gradually withdrew the tube from the ear. In this way evidence of "seeking" movements was produced; but some of the reports, especially those of *Bi*, indicate that an attentive factor was involved. The present problem is this: what is the normal response to an indifferent auditory stimulus the intensity of which is gradually and continuously decreasing?

A watch was used for stimulation. The following instruction explains the experimental procedure:

"After a 'ready' signal the experimenter will hold a watch near to your ear, and then move it gradually away. Attend to the sounds.

"You are instructed to describe the experience, noting especially kinaesthetic and organic processes."

The subject's chair was turned so that the apparatus lay on a table at the side. The tape was placed around *S*'s head and attached to the indicator. The slightest movement of *S* was immediately apparent to *E*. During the trials *S* sat with eyes closed. Twenty observations were made with each *S*: in the first series, five *R* and then five *L*; in the second, five *L* followed by five *R*. *E*, keeping his eye upon the seconds-hand of the watch, gave the preparatory signals and then placed the watch near the ear of *S*. It was moved away gradually for a distance of about 1 m. and over a period of time which varied from 12 to 25 sec. *E* noted carefully the movements of the pointer and recorded the result as well as the reports of *S*.

In every case, without a single exception for both subjects, there were definite movements toward the stimulus; and the order of magnitude of these movements is the same as that in the olfactory experiment. The movements were found for both ears. The verbal reports confirm the observations of *E*.

A reports as follows. "As the sound became fainter and fainter there was a concentration of attention to it. A tendency to grit the teeth and a tendency to move in the direction of the sound. This seemed a desire to do so rather than a tendency. There was a general tenseness of the body as it became fainter; relaxation when it seemed to get closer and louder." "Gritting of the teeth; closing of the eyes; muscular contraction; tendency to move in the direction of the sound." "Increased tenseness of the body as the sound gets fainter. When it appears again there is relaxation. A tendency (slight and perhaps imaginary) to move in the direction of the sound." "Tenseness about the shoulders, neck, and a slight tendency to move in the direction of the sound." "Turning of the eyes in the direction of the sound. Visual and kinaesthetic imagery of turning the head." "Slight strain sensations about the neck, shoulders, hands. Tendency to hold the breath.... A tendency to move in the direction of the sound." "A tendency to move in the direction of the sound; it seemed to be inhibited. A tendency to turn the eyes in the direction of the sound." "A decided tendency to move toward the sound—mostly inhibited. Holding of the breath. The eyes turned toward the sound." "A slight tendency to move toward the sound. There was some strain sensation."

G did not report movement toward the stimulus-object. At the close of the series he was asked whether or not he was aware of any movements. He replied: "Once in a while it seemed as if the kinaesthesia in the neck might be the result of movement but I am not sure. Once I thought that tactual processes from my collar meant movement but again I wasn't sure. These processes are part of the general set to get in the best attitude for hearing. I think there may have been a little movement."

Two types of forward movement were observed. (1) There was a gradual, progressive settling toward the source of stimulation—to the right or left—which continued through the series. This type of movement was indicated by the necessity of readjusting the standard which supported the indicator. The standard had to be moved away from *S* constantly so that the pointer would come to a vertical position before each test. The series of experiments was not long enough to determine how far this gradual and continued "seeking" would

go before coming to an equilibrium.⁶ (2) There was an immediate and definite forward movement which commenced shortly after the stimulus was presented and which continued throughout the relatively brief period of stimulation.

II. DISCUSSION OF RESULTS

Pursuit and Pleasantness. The experiments under auditory stimulation show conclusively that if *S* merely attends to weak sounds, or to sounds which are becoming intensively weaker, there are movements of approach which indicate sensory attention. These movements, observed when *S* is affectively indifferent, are of the same order of magnitude as those found in the olfactory experiment with *P* and *U* odors. Now if pleasant feeling is normally associated with attentive response and unpleasant feeling is accompanied by inhibition of the normal reaction, or by avoidance, or by some other response which may be called inattentive, then attentional pursuit should correlate, in the long run, with *P*, and its absence or opposite with *U*. It is extremely doubtful whether the pursuit movements observed in the present experiment express anything more than sensory attention. The actual extent of the movements of *S*'s head is very slight,—usually less than .5 cm. and never more than 2 cm. at the very most. Certainly such movements cannot be interpreted directly and unequivocally as expressions of pleasant feeling.⁷

The failure to find satisfactory evidence of seeking movements which are involuntary expressions of pleasantness is due once again, presumably, to experimental conditions. Corwin stresses the point that there must be an "incentive" to seeking; and her experimental conditions provide adequate incentives. In both the original experiment and the present one this element was lacking. *S*, indeed, was entirely free to move in either direction, but there was no suggestion of movement, unless possibly it were the tape attached to *S*'s head. Had there been some incentive, it is probable that gross seekings would have appeared. Corwin herself states that when she repeated the original experiment under my conditions, *i. e.*, without incentives to seeking, she found no evidence of "definite seeking movements or tendencies to move." If, therefore, some in-

⁶I believe that the same sort of gradual trend can be made out in the experiment with olfactory stimuli. Some of the respiratory curves, also, indicate a gradual adjustment in the forward direction.

⁷This result suggests the conclusion of H. C. Stevens that the "method of expression has failed in the domain of feelings" because of "complications with other mental processes, and . . . the psychophysical processes of the sensation." Stevens, H. C., A Plethysmographic Study of Attention, this JOURNAL, 1905, 16, 470.

centive is necessary for the appearance of gross seeking movements, we may well ask: in what sense are gross seeking movements an expression of pleasant feeling?

Comparison of Experiments. A comparison of my two experiments may possibly throw light upon the nature of seeking movements.

Under the original conditions⁸ there were 31 cases of P reported as having strong intensity against 27 cases of intense U: under present conditions there are only 3 cases of strong P against 25 strong U. In the original experiment, again, there were reported as many cases of relaxation as of strain:⁹ in the present affective experiment (with olfactory stimuli) relaxations are decidedly lacking. A reports 3 cases (all in P reports; not one, however, in the *intense* P reports); but G does not mention a single case. On the other hand, there is relatively much more straining reported by the Ss in the present data, A alone reporting 21 cases of strain associated with U. A great deal of the straining can be referred definitely to attentive attitudes.¹⁰ Although there are dangers in comparing two sets of data gained under different conditions, nevertheless the following statement is completely warranted by the facts; *viz.*, that under the original conditions there was passivity, relaxation, and moderately intense P feeling, relatively more intense P than U; and under present conditions there is a more active bodily attitude, little or no relaxation, but much strain (especially attentive), and a greatly reduced number of intense P reports relative to the number of intense U. It should be remembered that the present experimental situation, with the iron chair and S harnessed to an apparatus, was devised specifically to meet the criticism that the original conditions favored relaxation and passivity and that on this account they were unfavorable to active seeking movements. It turns out (1) that present conditions which presumably favor an active type of response by making bodily relaxation next to impossible are not at all favorable to the development of affectively intense pleasant feelings¹¹ and (2) that the failure to find valid evidence for pursuit movements as expressions of P is not due to S's comfort or lack of comfort but rather, as Corwin herself remarks, to the lack of a special incentive.

⁸*Op. cit.*, 46.

⁹*Op. cit.*, 40.

¹⁰It should be noted that A reports her strains as contractions and her relaxations as expansions or openings (of the throat). G speaks of "muscular contractions" and describes as "kinaesthetic sensations" processes which other Ss might describe as strain. The distinction between relaxation and expansion, made by Corwin's observers, *may be* valid, but at the present time I am inclined to think that it is largely verbal.

¹¹The fact that relaxation favors the development of P feeling does not

III. CRITICAL

Incentives and Seeking Movements. Common instances show that seeking movements are not expressions of pleasant feeling but rather of some incentive or need. (1) Imagine *S* seated comfortably in a Morris chair listening to his favorite piece of music played upon a phonograph. If the selection is loud and clear, he will probably lean back and relax (not a withdrawing movement, however, merely because the phonograph happens to be in front!); he may beat time. In any case the affective experience is ordinarily *P*. If the music be intensively weak so that *S* would have to 'strain' to hear it, or if *S* had to pursue a receding rubber tube in order to hear the music well, the total affective experience would not be so *P* as under the first conditions. Hence seeking movements do not express *P* feeling *as such*; they show, rather, that the conditions for *P* are not wholly satisfactory in some respect or other. *S* will make movements which are necessary to gain satisfactory conditions or to maintain them, if need be; but the seeking movements are not involuntary expressions of *P*. (2) In definite and extreme cases of seeking behavior the affective experience is normally *U*. A drowning rat "seeks" air: a hungry dog "seeks" food: an animal in heat, confined in a cage, "seeks" a mate: a man in a burning house "seeks" safety. These seeking movements express the presence of some need, irritant or incentive rather than *P* or *U*; but, if we are bound to associate seeking movements with either of the traditional affective qualities, I submit that definite and extreme seeking behavior is ordinarily accompanied by *U*. (3) There are also instances of apparent "seeking" which are affectively indifferent. Following an insect or a moving object from curiosity is a case in point. The entire group of attentional "seekings," referred to above, should be mentioned here. (4) Again there are complex and prolonged examples of seeking which involve many changes from *P* to *U* or *I*. Consider a hunting expedition in which a day is spent hunting prey; or consider a life-time spent in seeking a fortune or fame. In these cases there is some

mean that all *Ps* are essentially or even typically relaxations. There are other types not dealt with in the present series of studies.

There can be no doubt that *P* is associated with active bodily response in such instances as dancing, beating time to music, free swinging movements (as in certain games), bodily exercises, etc. It also appears that normal uninterrupted physiological functions are frequently, if not normally, accompanied with pleasant feeling. Obvious examples are deglutition and the habituated manipulations which accompany it, coitus, even defecation and urination in some cases, and the entire group of free movements referred to above. In an unpublished experiment upon the affective phase of active movement, two subjects report *P* associated with free swinging movements of the leg, flexed at the knee.

determination (motive, incentive) which expresses itself in seeking movements, but any attempt to relate the movements themselves to either of the traditional affective qualities is utterly futile.

There can be no doubt that "seeking" movements *may* be associated with P. Corwin's experiment proves the point; but the conditions for such an association involve two factors: (a) a weak or receding stimulus, or some other unsatisfactory element in the conditions—a need, irritant, incentive, motive—which makes it necessary for *S* to seek or pursue if he is to react adequately and to maintain conditions under (b) stimulation which is normally P. The factors which condition seeking movements are obviously neither necessary nor favorable to the existence of P feeling. The necessity for seeking reduces the intensity of P obtainable and the reduction may go to I or even to U; extreme cases of seeking are U rather than P. If seeking movements express anything, that is an incentive, need, or irritant rather than simple feeling.

It is impossible, therefore, to accept Corwin's interpretation that "the direct response of the organism to P is . . . a definite activity of pursuit or of tendencies to pursuit." Obviously she has got out of her experiments exactly what she put in. With a little thought it would be possible to devise experimental conditions under which pleasantness would appear to be associated with movements of avoidance.

Sources of Confusion. There is yet another serious objection to the traditional hedonistic doctrine. The reputed correlations between P and seeking and between U and avoidance are both teleological interpretations of behavior. "Seeking" implies an organism purposefully striving for some object or situation which is the aim in view; "avoiding" may have a similar connotation. The teleological nature of these terms is obvious from the following illustrations. Relaxing in a Morris chair while listening to music is "withdrawing" from the phonograph and "seeking" the chair, according to the way in which we interpret the situation. A hunter goes forth to seek a bear; but when the animal is found, perhaps the same man "seeks" safety by "avoiding" the bear. The random incoordinated movements of a drowning rat may be interpreted as "seeking" air or "avoiding" confining conditions. One "seeks" food to "avoid" hunger. Illustrations of this sort could be increased indefinitely to show that "seeking" and "avoiding" are teleological and, moreover, dynamistic interpretations of behavior.¹² The statement that behavior has some purpose or other does not

¹²For the present study these terms were defined in a purely descriptive way to avoid the above implications.

contribute anything to an exact analysis of the facts; it is at best a preliminary statement. Since one can easily read into the same response either the purpose of "seeking" or the purpose of "avoiding," the teleological interpretations lead only to confusion of thought; they do not make for logical clearness.

But there is another source of confusion. Those moralists and biologists who associate P feeling and seeking movements have fallen into an error which I have called 'the meaning error'.¹³ To say that one seeks pleasure is not the same as to say that seeking is a bodily accompaniment of P, a mark or expression of pleasantness which is truly felt. What is meant is that one seeks the conditions of pleasure, or seeks to maintain them after they have been obtained. This statement, whether true or false, has little to do with the factual question raised in the present experiment. It may be true, in a sense, that the readiness to seek is the roughest kind of indication of those objects and situations capable of pleasing us; but this is very different from regarding movements of search as typical marks, or expressions, or involuntary characteristics of felt pleasantness. There is no good evidence for the latter belief.

Avoidance and Unpleasantness. It should be noted that, in the case of U and avoidance, there is a solid body of fact which lends itself readily to the traditional interpretation. Characterizing the U response, I have previously noted¹⁴ the "well-known tendency to withdraw oneself from the stimulus-object, either reflexly or deliberately . . . (and) the tendency to put the object away from oneself or to prevent its action . . . (and the) tendency to inhibit or resist . . . some normal response to the stimulation . . . (and finally, the presence of) reflex twitchings, convulsive contractions, and bodily reverberations of various sorts, especially when the stimulus-object is presented suddenly and there is an element of surprise." Neglecting the last mentioned characteristic, it appears that the others have the biological meaning of avoidance, defence or resistance.

The present study, however, indicates that nothing is added to the facts by interpreting these U responses as biological avoidances. As in the case of P and pursuit, there are obvious exceptions to the reputed correlation.¹⁵ It cannot be maintained that all avoiding expresses U. Outstanding instances of the relationship (jerking away the hand when burned, turning the head from a disagreeable sight, holding the breath or vomiting when an U odor is presented, etc.) do not justify a sweeping generalization.

¹³Young, P. T., An Experimental Study of Mixed Feelings, this JOURNAL, 1918, 29, 261f.

¹⁴*Op. cit.*, 49f.

¹⁵Suppose, for example, that we define avoidance as getting away from

The direct explanation of "seeking" and "avoiding" behavior may be given ultimately in physiological or chemical terms, but it should be remembered that the mechanisms of response are extremely complex. The central nervous system is highly variable and a thousand factors may intervene between stimulus and response. One factor alone—the experimental instruction, or the self-instruction, of *S*—is capable of turning a "seeking" movement into an "avoidance." Consequently it seems methodologically better to await more information than to read into the facts now at hand some purpose.

SUMMARY

1. In the case of olfactory stimuli of moderate intensity pleasant feeling is sometimes associated with a slight forward movement of the head; and unpleasant feeling, with a slight backward movement. Occasionally no movement at all, or both forward and backward movement, is observed. The reports indicate that forward movement is frequently an indication of olfactory attention. Any interpretation of the data is complicated by the fact that inhalation is accompanied by a backward movement and exhalation by a forward; these respiratory movements are purely mechanical incidents in deep breathing.

2. Attention to a weak and affectively indifferent auditory stimulus, or to one which is decreasing in intensity, is indicated by an involuntary muscular adjustment toward the stimulus. Two types of movement have been noted: (1) a gradual trend toward the source of stimulation which continues throughout the experimental series, and (2) brief and relatively marked movements during the period under controlled observation.

3. Seeking movements, other than those of attention, do not appear as "expressions" of pleasantness unless some incentive is introduced into the conditions. The incentive probably reduces the intensity of feeling obtainable and is not

an object or situation, or casting it aside. Immediately one thinks of taking off an overcoat and hat. Such behavior has no apparent relation either to *P* or to *U*, although it is definitely a matter of casting aside. The next illustration that occurs is a chase in which one animal runs away from another. Are we to assume that the avoiding animal feels only *U* and that the pursuing animal experiences nothing but *P*? Again, Professor Bentley has called my attention to the fact that the play of courtship, which may be assumed to be *P*, is generally regarded as pursuit on the part of the male and as avoidance on the part of the female.

It may not be far-fetched, accepting the above definition, to regard urination and defecation as instances of rejection; and these experiences, according to Boring's observers, may be *P*, *U*, or *I*, varying with the individual. Boring, E. G., Processes Referred to the Alimentary and Urinary Tracts: A Qualitative Analysis, *Psychol. Rev.*, 1915, 22, 323f.

necessary to the existence of pleasantness. Consequently the statement that pleasantness is expressed by involuntary seeking movements is abandoned.

4. A critical analysis shows that seeking movements indicate what might be called a need, irritant, incentive, or determination, rather than simple feeling, and that "seeking" and "avoiding" are teleological interpretations of behavior, and, further, that the reputed correlations involve a confusion between meaning and affective processes. For these reasons it is recommended that the traditional hedonistic doctrine be abandoned and that psychologists study directly the facts of response and of affective psychology.